SAFARI MONTAGE

September 15, 2014

VIA ELECTRONIC FILING

Ms. Marlene H. Dortch
Secretary
FCC Headquarters
445 12th Street, SW, Room TW-A325
Washington, DC 20554

Re: Comments of SAFARI Montage To Report and Order and Further Notice or Proposed Rulemaking, Released: July 23, 2014 ("The E-Rate Modernization Order"). WC Docket No. 13-184

Dear Ms. Dortch:

SAFARI Montage, founded in 2005 by two experienced K-12 educational technology and media veterans, Timothy Beekman (President) and Andrew Schlessinger (CEO), is the leading Learning Object Repository company, specializing in the management, distribution, storage, and access of digital video to the US K-12 market. SAFARI Montage is well known for its line-up of high quality educational video publishers that comprise its 9,000 title video streaming library.

I. Introduction:

The FCC is seeking comment on the proposed changes to the E-Rate program outlined in *The E-Rate Modernization Order.* Of the proposed changes, the FCC has suggested and commented on adding caching servers as an eligible broadband internal connection component. The reason for this change is premised on the new direction and focus the FCC sees as the goal of E-Rate Funding: to provide support for the high-speed broadband that schools need in order to take advantage of bandwidth-intensive digital learning media on wired and wireless internal networks providing high-speed access to the Internet on mobile devices as well as desktops. (Seventh Order, Page 3, Paragraph 1). Thus, the FCC has recognized the important role that rich media data is serving in education today, and the important role it will play in the future. "High-speed broadband also creates opportunities for customized learning, by giving our students and their teachers access to interactive content, and to assessments and analytics that provide students, their teachers, and their parents real-time information about student performance while allowing for seamless engagement between home and school." (Seventh Order, Page 4, Paragraph 2). Furthermore, the FCC specifically recognized that there are increasing bandwidth demands caused by streaming video and Wi-Fi enabled devices including increasing mobile devices for students. (Seventh Order, Page 18, Paragraph 40).

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In the E-Rate Modernization Order, the FCC notes: "The peak bandwidth usage of media-rich curriculum and streaming video applications far exceeds the usage of basic web browsing and e-mail." Caching is a critical function in optimization of bandwidth utilization for digital video, hence its inclusion on the ESL to enable the FCC and E-Rate to succeed in meeting these goals. Cached files allow for instant access by teachers and students, while using significantly less bandwidth than if the file were requested from the internet each and every time. Our experience is that in education, digital video represents, on average, about 80% of all network bandwidth. SAFARI Montage is uniquely positioned in the market, as we have worked tirelessly to develop the means by which digital video can be accessed instantly by teachers and students without causing significant bandwidth usage. As such, SAFARI Montage has the expertise to aid and provide comment to the Wireline Competition Bureau in defining caching, and identifying what equipment and software is necessary to support this service.

It is the position of SAFARI Montage that the proposed FCC direction for defining caching does not adequately represent caching as it pertains to the educational environment. We believe that the FCC should include "video" in the description of caching as a service by defining caching as: "**a video caching server, which can be located on the edge of a Local Area Network or Wide Area Network and the internet which is capable of ingesting, storing and instantly and simultaneously playing hundreds of separate requested educational digital video streams based on real-time educational needs, that also applies bandwidth efficiency software to effectively and significantly reduce the amount of internet bandwidth that would have been consumed had the digital video content been hosted on and played from the internet.**"

Furthermore, bandwidth efficiency software shall include auto-conversion technology for ingested digital video to be converted into multiple formats for more efficient playback to various devices. Digital video is data dense. The files tend to be extremely large and require communication back and forth between the storage location, and the device. Hence, digital video can cause significant strains on a network by consuming large amounts of bandwidth. However, if the storage location is local, and the device does not have to continually communicate through the Internet, the demands on the network are significantly diminished.

II. The Shortcoming of Defining Video Caching In Terms of "Temporary Storage of Information Accessed From The Internet."

As was demonstrated above, digital video is an important part of current and future school curriculum, and the demands it causes to networks is extremely high. Therefore, it makes sense that the FCC has suggested that caching servers but an eligible service. The problem then becomes how do we define caching servers?

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The FCC described caching in the E-Rate Modernization Order as "the local storage of information so that the information is accessible more quickly than if it is transmitted across a network from a distant server." They further wrote, "by placing previously requested information in temporary storage, caching functionality can, in certain circumstances, optimize network performance, and potentially result in more efficient use of E-Rate funding." (Seventh Order, Page 51, Paragraph 130. Emphasis Added).

However, "placing previously requested information in temporary storage" in the manner that traditional well known caching servers function is certainly not the only way of achieving the reduced bandwidth outcome, and not what we believe is the best way in education. If the school district Curriculum Department plans a lesson for a given day, that media may not have been previously requested on that server, but merely may have purchased and planned for that event. Therefore, temporary caching is not the only, and probably not the most effective means of insuring that required rich educational media is resident on local school district servers when needed.

Looking back, the FCC has already provided a definition for caching, specifically in the 2014 ESL caching servers are defined as those servers that "store information locally so that the information is accessible more quickly than if it must be transmitted across a network from a distant server storage mechanism at the border of a network and the Internet that holds frequently accessed Internet information, thereby reducing retrieval times for information often requested from the Internet." See Eligible Services List 2014, page 29. Caching (Servers—Ineligible)(Storage Devices—Ineligible). This has been the definition of caching for many years. Most importantly, to meet the goals of the E-Rate Modernization Order, this definition avoids the requirement that data is "temporarily stored" or "previously requested."

III. Ingesting Data.

Next, SAFARI Montage also holds the belief that any definition of "video caching" must specifically avoid the use of terms that suggest "data is stored only temporarily" or that the video must have been "previously requested from the Internet," as suggested in the E-Rate Modernization Order. SAFARI Montage believes that this definition is nearly satisfactory; however, to meet the goals of the E-Rate Modernization Order, we also believe that it needs to be slightly modified. To that end, it is our position that the definition of video caching should be updated to address the storage of video vs. all information. Therefore, video caching should be defined as "the storage of video locally, at the border of a network and the Internet, so that video is accessible more quickly than if it was transmitted across a network from a distant server." This definition of caching would allow for the reduction of retrieval times for rich media data requested from the Internet. It is the position of SAFARI Montage is that there should be no differentiation to whether the data is ingested through an Internet request, or if the data ingested by being locally uploaded. A video cache server can only reach its potential bandwidth saving potential if data can be cache locally that is uploaded locally.

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IV. A Definition Of Caching Which Will Fulfill The E-Rate Modernization Order's Goal.

It is the position of SAFARI Montage that the proposed FCC direction for defining caching does not adequately represent caching as it pertains to the educational environment. The cited definitions and descriptions are adequate if we are only concerned with caching information from an individual person "surfing the web" on a "personal device." But this limited definition will not meet the goals set forth in the E-Rate Modernization Order. Thus, a "cache" should not be limited to "temporary storage" nor should it require the data to have been "previously requested from the Internet." We believe the definition of caching should reflect the needs of our educators, the strains that digital video places on a network, and the way data and files are ingested. E-Rate should provide funding for the secure preservation of permanently cached data on the educational facility's network. Only by ***not requiring*** that large amounts of data be downloaded from locations outside of the facility can there be the true savings of bandwidth that the FCC seeks in making caching an eligible service.

Caching digital video locally, with the addition of caching intelligent management software added to the devices where the files are stored, helps to manage the local bandwidth. Furthermore, there are often multiple versions of the same data, each in different formats that are appropriate for different devices. Management software can detect the devices that are requesting the data files and serve up appropriate, lower bandwidth versions of that data, such as to mobile devices or other devices on the wireless local network.

A. Necessary Hardware.

We believe the only necessary hardware for this type of system is a Cache Server. We estimate that the storage need for such a server would be one (1) Terabyte per 1,000 students served, with an estimated server cost of $10,000. Furthermore, we see the cost as being relatively minimal especially considering the significant burden that the network would be freed from in downloading content from the Internet.

B. Necessary Software.

In terms of software, the most important piece would be the Caching Management Software that intelligently manages the ingestion and distribution of the educational digital video content to students and teachers in school and at home. This software is able to select the most appropriate format and bitrate of the requested digital video content by auto converting ingested files for efficient playback based on a user's location, device type and user type in order to effectively utilize bandwidth. Additionally, the software will also select the node of the system that will most efficiently distribute the content to the requester. The software can also manage other items such as content availability to each user and time restrictions to support bandwidth

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needs. The estimated cost for this type of software would be $2000 per 1000 students/year, again, a relatively minor amount to pay for a significant gain in overall network speed. Within this definition, it is essential for the Commission to consider caching management software as an essential component of the video caching server in ingesting and transporting digital video across schools' local and wide area networks and to the home. We are confident that upon closer and more careful examination, the Commission will conclude that video caching servers are absolutely necessary to ingest, store and transport digital video information to the classroom and to the home.

V. Examples Of How Permanent Caching Can Benefit Bandwidth.

Educational content represents the single largest consumer of bandwidth on school networks making it essential for this to be handled efficiently. SAFARI Montage believes strongly that this content should not be hosted on the cloud because there isn't sufficient bandwidth to support it reliably, particularly in an environment that is supporting one mobile device per student. In our analysis, a school district should assume an allocation of educational content bandwidth of 100Kbps/student (including the teachers), even prior to other uses of the network. Therefore, SAFARI Montage places caching servers inside the school district Wide Area Network to preserve the District's precious Internet bandwidth for other vital functions. This model provides for an educational environment across the entire District that does rely upon the Internet connection and does not impact other web-related functions and activities. In our experience with internet delivered digital video educational content, clients have expressed to us many times that success is the biggest failure. As a few teachers begin to use the system and love the value that it brings to education, they share that with other teachers, who also begin to use the system. Very soon, you have many teachers and students requesting educational content, which can range in bandwidth from a few Kbps to many Mbps. The available internet bandwidth quickly becomes saturated and teachers become frustrated and lose faith in the value of the system. When using a local video caching system, we have seen the opposite happen. Success now truly equals success and all of the teachers and students can experience the educational benefits of the system.

An excellent example can be found in one of the leading School Districts in the country, Forsyth, Georgia with a population of 40,000 students. Before providing a caching system from SAFARI Montage, access time for internet hosted digital video resources was around 23 seconds. This is a district that had over 500 Megabytes of Internet bandwidth. When the SAFARI Montage video caching system was installed, their access time fell dramatically to 5 seconds per resource. Not only does excellent access keep the student engaged and curtail lost education time on task but also ensures reliable access to digital video content every time. SAFARI Montage was able to reduce the time to access a resource by 18 seconds, resulting in a net savings of instructional time of over 200 hours leading to a net reduction in Internet traffic of over 30%.

VI. Conclusion.

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Today, there is no question that caching servers play a mission critical role in transporting digital video across schools' local area networks. We contend that by adding video caching servers are absolutely necessary to transport digital video to the classroom and home. By defining caching as: "**a video caching server, which can be located on the edge of a Local Area Network or Wide Area Network and the internet which is capable of ingesting, storing and instantly and simultaneously playing hundreds of separate requested educational digital video streams based on real-time educational needs, that also applies bandwidth efficiency software to effectively and significantly reduce the amount of internet bandwidth that would have been consumed had the digital video content been hosted on and played from the Internet,**" the FCC will be in a better position to meet the goals set forth in the E-Rate Modernization Order. Furthermore, it is also critical that any definition of caching adopted by the FCC avoid the limitations that terms such as "temporarily stored" or "previously requested" would cause. This language, suggested in the E-Rate Modernization Order, would actually prevent the goals of The E-Rate Modernization Order from being accomplished. Ultimately, educators need the ability to locally store information that they can access instantly and repeatedly, whether that is daily, monthly, or yearly. Therefore, the definition suggested by SAFARI Montage meets the needs of educators, students, and the FCC's goals expressed in the E-Rate Modernization Order.

Respectfully Submitted,

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